far as we can judge, to be a really useful compilation. It gives great masses of very varied data about all sorts of examinations; contains an excellent "Calendar of Examinations" and much general information such as masters and their pupils need, and it is provided with a useful index.

THE ROYAL SOCIETY CONVERSAZIONE.

A LARGE number of exhibits of scientific interest were on view at the conversazione of the Royal Society, held on Wednesday of last week. Following our usual course, we give a list and brief descriptions of the objects exhibited, abridged from the official catalogue:—

The Badische Anilin and Soda Fabrik, Ludwigshafen on the Rhine, had an exhibit of synthetic indigo, consisting of (*a*) specimens of the raw material (naphthalene) and the intermediate products formed in the manufacture of synthetic indigo, as well as of the latter in four different forms; (*b*) examples of various textile materials illustrating the application of synthetic indigo on loose wool, slubbing, military cloths of different nations, cops, cross-reeled bundles, cotton piece goods both dyed and printed.

Mr. R. L. Mond and Dr. M. Wilderman exhibited a new and improved type of chronograph, in which, instead of moving the heavy drum, the clock moves a very light spindle carrying the writing pen round the drum.

Dr. J. Mackenzie Davidson showed (1) stereoscopic X-ray transparencies and negatives in a Wheatstone stereoscope and in a revolving stereoscope; (2) X-ray photographs of a bullet fired from a revolver. Dr. Davidson also demonstrated that if an ordinary photographic plate be exposed to X-rays and then to ordinary diffused actinic light, a reversed negative is obtained on development in bright white light.

An improved form of Thomson coal-calorimeter was exhibited by Mr. W. Rosenhain.

Apparatus for natural colour photography, and examples of its applications, were shown by Messrs. Sanger Shepherd and Co., who also exhibited a new camera for securing the three negatives through one lens at one exposure, and a camera for photomicrographic work fitted with colour filters for natural colour photography.

By means of a three-circle goniometer exhibited by Mr. G. F. Herbert Smith, the determination of the symmetry and the interfacial angles of crystals is considerably simplified; the crystal needs to be only once adjusted for the whole series of observations. By means of the particular optical arrangements in this instrument, measurements may be made through more than 180° across the end of the crystal by rotation of the horizontal circle only.

The Department of Applied Mathematics, University College, London, showed (1) a curve-adder, made by G. Coradi, of Zürich, for Prof. K. Pearson, F.R.S.; (2) lecture models, illustrating graphical treatment of girder-deflections; (3) a circular slide rule and planosphere, made about 1670, the former on Oughtred's system; (4) a slide rule, designed by Prof. de Morgan, and believed by him to be first circular slide rule.

Notabilia of Gilbert of Colchester were exhibited by Prof. S. P. Thompson, F.R.S.

Prof. G. Forbes, F.R.S., showed his folding range-finder, which has already been described in these columns.

Mr. J. Stanley Gardiner showed photographs of natives of the Maldive Archipelago, and photographs of the coral reefs.

Coloured sketches of birds and fishes obtained during the voyage of the *Discovery* to New Zealand were exhibited by Mr. E. A. Wilson.

Mr. J. Gray exhibited cephalometric instruments and cephalograms specially designed for measuring and taking contours of the living head.

The director of the British Museum (Natural History) showed (1) models of deep-sea fishes (*Gastrostomus bairdi* and *Saccopharynx flagellum*); (2) three statuettes of horses and one of a Hungarian bull, one-fourth natural size, by G. Vastagh, of Buda-Pesth. These were exhibited with a view to direct attention to the desirability of having similar models made of the British breeds of horses and cattle.

Newly discovered fossil mammals and reptiles from Egypt were also exhibited by the director of the British Museum (Natural History). The principal mammalian remains exhibited were those of Mœritherium and Palæomastodon, from the Upper Eocene and Oligocene respectively, which seem to be the oldest known ancestral Proboscidea. Mœritherium is a comparatively small animal, still retaining the canines and all the incisor teeth in the upper jaw, though the second pair of incisors is much enlarged. Palæomastodon has nearly reached the stage of dentition known in Mastodon, but more teeth are simultaneously in use, and the third molar is simpler than in the latter. Barytherium, represented by a mandible and part of the upper jaw, is a large and massive animal of uncertain affinities. The vertebræ named Gigantophis indicate the largest known snake, probably 50 feet in length.

On behalf of Colonel Sir Edmund Antrobus, Bart., Mr. W. Gowland showed a number of stone implements, &c., from Stonehenge.

On behalf of Miss Breton, the Rev. H. H. Winwood showed some striking water-colour sketches, executed by her, of cañons, glaciers and waterfalls in the United States and British Columbia, illustrating effects of various agents in land-sculpture.

Mr. T. Andrews, F.R.S., exhibited photomicrographs of the crystalline structure of platinum and of the crystalline structure of large steel ingots. Prof. A. H. Church, F.R.S., showed series of zircons from Ceylon, illustrating range of density and colour. Dr. C. A. MacMunn showed (1) the spectrum of a zircon; and (2) spongioporphyrin, the colouring matter of *Suberites Wilsoni*, an Australian sponge. This name has been given by Prof. Ray Lankester to the above pigment. The pigment gives a very remarkable absorption spectrum, recalling to mind that of oxyhæmoglobin, of turacin, of carminic acid, &c.

Some successful attempts to reproduce polarisation effects by three-colour printing were shown by Prof. H. A. Miers, F.R.S. The pictures were collotype prints from photographs of the coloured interference figures produced by crystal sections in a polariscope.

The experiments shown by Prof. J. A. Fleming, F.R.S., to illustrate the effect of ultra-violet light on the electric discharge attracted much attention. Effects of ultra-violet radiation were also shown by Dr. Dawson Turner.

Sir Norman Lockyer, K.C.B., F.R.S., showed (1) metallic spark spectra in air and water. Photographs of spark discharges from poles of iron, magnesium, zinc and copper showing (*a*) broadened bright lines, (*b*) broadened bright lines with central absorption, and (*c*) broadened bright lines with non-symmetrical absorption (maximum of emission towards red); (2) spectra of meteorites on silver poles, showing the varying intensity of lines due to special constituents; (3) spectra of rocks and minerals on silver poles, showing distribution of vanadium, titanium, chromium, &c.; (4) spectra of plant ashes on silver poles.

A new temperature indicator (Whipple's) was shown by the Cambridge Scientific Instrument Company. This instrument is intended for use with a platinum resistance thermometer. The bridge-wire is wound on a cylinder in the form of a screw, and the sliding contact is moved until the resistance of the thermometer is balanced.

Mr. C. E. Stromeyer gave an experimental illustration of one cause of steam-pipe explosions.

A new and very effective electrical influence machine suitable for campaign work with Röntgen rays was shown by Mr. W. R. Pidgeon.

One of the most novel exhibits was a large prism of vitreous silica shown by Mr. W. A. Shenstone, F.R.S., and Mr. J. W. Gifford. The employment of vitreous silica in optical work has been delayed by the impossibility of building up very large and perfectly homogeneous masses of the material in the oxy-hydrogen flame. But this difficulty has now been overcome to a great extent.

Prof. Wyndham R. Dunstan, F.R.S., director of the scientific department of the Imperial Institute, exhibited (1) poisonous fodder-plants and food-grains, and their cyanogenetic glucosides. These illustrate an investigation of the cause of the hitherto obscure poisonous action of certain Indian and Colonial fodder-plants and food-grains. The plants shown have now been proved to furnish prussic (hydrocyanic) acid, and in the cases of

Lotus arabicus and *Sorghum vulgare* the poison has been shown to have its origin in cyanogenetic glucosides, which occur in the young plant, but gradually disappear as the seeds ripen; (2) Indian and Egyptian drugs and their constituents. (*a*) *Hyoscyamus Muticus* and *Hyoscyamine*. This remarkable plant, probably the "nepenthe" of Homer, grows both in India and Egypt, and has been long known as a constituent of narcotics under the name of "bheng" or "bhang." It has been found to contain the alkaloid, hyoscyamine, in larger proportion than any other known plant. As the plant is abundant in Egypt it is now being exported for the manufacture of this alkaloid, which is used medicinally. It grows abundantly in the sand of the desert, which analysis shows to be nearly free from nitrogenous compounds. The manner in which the plant obtains its nitrogen is being investigated. (*b*) Indian Aconites and their poisonous alkaloids. (3) India-rubber from Bahr el Ghazal and Zululand. Varieties of gutta-percha from Sarawak, Ceylon and West Africa: (4) coal, iron ores, mica, and other minerals from India, British Central Africa, Nigeria, Somaliland, Trinidad, and the Grecian Archipelago; (5) specimens of tobacco cultivated in Bermuda, with photographs of the crops; (6) specimens of Indian and Australian gums and resins. (*a*) *Cochlospermum gossypium* (India) and *Sterculia acerifolia* (Australia). These gums possess the peculiarity of generating acetic acid when exposed to the air. (*b*) *Callitris verrucosa* (Australia). This resin is remarkable in containing a volatile resin. The resin resembles sandarac in its properties, and is likely to be of commercial value.

Mr. W. M. Mordey and Mr. G. L. Fricker showed an electricity meter invented by them, and intended especially for consumers having a comparatively small number of lamps. It consists of an ordinary clock, deprived of its hair-spring, and carrying a few pieces of iron wire or strip on its balance wheel. This balance wheel is surrounded by a coil of wire conveying the current to be measured. With this arrangement the oscillations of the balance wheel are directly proportional to the current through the coil, with either direct or alternate current. The clock therefore goes at a speed proportional to the current, but does not go at all when there is no current. Geared to the clock is a counter which records the ampere-hours or (on constant pressure circuits) the kilowatt-hours or Board of Trade units.

Prof. W. Ramsay, F.R.S., had an exhibit to illustrate that many persons see the colour of a vacuum tube containing krypton as lilac, many as green. The phenomenon appears to be conditioned by the size of the yellow spot on the retina.

Film structures in metals and other plastic solids were shown by Mr. George Beilby. Metal surfaces are covered with a transparent lacquer-like film of their own substance. This covering film is formed by the welding together of minute reflecting films or "spicules." Spicules are visible in all metal surfaces, but are specially well seen in surfaces which have been frosted by the action of heat and chemical reagents. When the rounded end of a burnisher is drawn across a frosted surface, the separate films are welded into a transparent continuous film.

Prof. A. Schuster, F.R.S., exhibited (1) the spectrum of iron in the flame of the Bunsen burner; (2) a Rowland grating of one metre focus.

The scales of fishes as an index of age was the subject of an exhibit by the Marine Biological Association. The scales of many fishes show a series of parallel eccentric lines, which indicate successive increments of growth. These lines of growth have been found to be more widely separated in that part of the scale formed during the warm season of the year than in the portion formed during the cold season. The alternation of the two series gives rise to the appearance of "annual rings," which indicate the age of the fish in years. The markings are subject to individual variation, and Mr. J. Stuart Thomson has been engaged on their investigation in fish of different species captured at all seasons of the year. His results show that it is possible to determine the age of individual fishes of many species with considerable precision—a conclusion which will greatly facilitate the study of other points in the natural history of fishes, and has important practical applications.

Mr. A. C. Cossor showed (1) a "Braun" tube for kathode rays; (2) a new therapeutic X-ray tube. The object of the "Braun" tube is to permit of a wide range in the different experiments that can be made, showing the action of magnetic disturbances on the kathode rays. In this tube these magnetic effects are delicately and precisely shown.

Mr. J. E. Stead's exhibit consisted of (1) micro-structure of iron, and meteoric irons containing free phosphides and carbides of iron and nickel; (2) the micro-constituents of steel.

The Cambridge Observatory exhibited diagrams referring to preliminary results of the solar parallax, from observations of the planet Eros.

The Royal Astronomical Society showed photographs of the nebula surrounding Nova Persei, photographed by Mr. G. W. Ritchey, Yerkes Observatory, U.S.A.

Manuscripts relating to the discovery of Neptune, by the late Prof. J. Couch Adams, F.R.S., were shown by St. John's College, Cambridge, through Prof. R. A. Sampson. The manuscripts date from 1841, when, as an undergraduate in his second year, Adams first determined to attack the problem, to 1846, when the planet was discovered. In all, Adams made no less than six separate solutions of the problem, similar in method but largely independent, each advancing in some particular upon the last. Of these the earliest, though necessarily the least perfect, is perhaps of most interest. It was completed at the end of September, 1843, three years before the planet was observed with the telescope. The position assigned to Neptune by this first determination was some 18° from the truth. The solution dated April 28, 1845, departs from the subsequently observed position by 3°; that of September 18 and October of the same year by less than 1°; that of August, 1846, by about 1½°.

Mr. A. Vernon Harcourt, F.R.S., showed an apparatus for the regulated administration of chloroform.

Mr. J. E. Petavel and Captain J. Bruce-Kingsmill exhibited (1) a recording pressure gauge for artillery; (2) a recording pressure gauge for low-pressure explosions (suitable for gas-engine research and experimental physics), shown by Mr. J. E. Petavel. A description of the apparatus will be found in the current number of the *Philosophical Magazine*.

The National Physical Laboratory showed a plane mirror, given to the Laboratory by Dr. Common, F.R.S.

Living specimens of ovivorous parasites (Mymaridæ), together with larvæ and pupæ in the eggs of Liburnia (frog-hoppers), were shown by Mr. F. Enock.

Mr. W. E. Hoyle showed luminous organs in *Pterygioteuthis margaritifera*, a Mediterranean Cephalopod. The most striking feature of these organs is that they are concealed by the integument, and are only effective by reason of its transparence in the living condition.

Lieut.-Colonel Bruce, F.R.S., exhibited *Trypanosoma Theileri*, a new species of parasite discovered in the blood of cattle in South Africa. This new Trypanosoma was lately discovered by Dr. A. Theiler, who is in charge of the bacteriological laboratory of medical officer of health, Pretoria, Transvaal. The species can be at once distinguished from the Trypanosomas of Surra, tse-tse fly disease, or rat by its larger size, it being almost twice as large as any of the others. In general appearance it conforms closely to the others in possessing an oval protoplasmic body, a longitudinal fin-like membrane and a single flagellum. It only infects cattle. Horses, dogs, goats, rabbits and guinea-pigs are all immune, neither showing symptoms nor the presence of the parasites in the blood.

A specimen of a Trypanosoma found in the blood of man was shown by Mr. J. Everett Dutton on behalf of the School of Tropical Medical, Liverpool. The Trypanosoma was first discovered in the blood of a European in Government employ at Bathurst, West Africa. The presence of the parasite was associated with symptoms closely resembling those occurring in animals suffering from tse-tse fly disease. The parasite was again found in a preparation of blood taken from a native child at Bathurst (see p. 15).

Messrs. R. and J. Beck, Ltd., exhibited the "Imperial" microscope with mechanical adjustments for critical work, showing Grayson's micrometer rulings in realgar up to 60,000 lines to the inch.

A collection of ear-rings from British New Guinea was shown by Dr. A. C. Haddon, F.R.S.

Microscopic preparations of *Astrosclera Willeyana*, with specimens illustrating the determination of the mineral constituent of the skeleton by Meigen's method, were shown by Mr. J. J. Lister, F.R.S., and Mr. A. Hutchinson. Astrosclera was first collected by Dr. A. Willey in the Loyalty Islands, and has since been obtained at Funafuti in the Ellice group. It is regarded as the type of a distinct division of sponges, and differs from other known calcareous sponges in the structure of the soft

tissues and the skeleton, and in the fact that the mineral constituent of the latter is not in the form of calcite.

Mr. E. T. Newton, F.R.S., showed a series of otoliths, chiefly of living British fishes, both marine and freshwater, showing the various forms assumed in the different genera.

Prof. W. K. Huntington exhibited (1) a tilting stage for the microscope; (2) optical bench for metallurgical work.

Dr. A. Muirhead gave a demonstration of retransmission on submarine telegraph cables (cable relaying).

Kite and winding-in apparatus for raising meteorological instruments was shown by Mr. W. H. Dines.

The distribution of electric currents induced in a solid iron cylinder when rotated in a magnetic field was shown by Prof. E. Wilson.

During the evening, demonstrations, by means of the electric lantern, were given in the meeting room by Sir Henry Trueman Wood, on the application of photography to the production of pictures in colour, and Dr. R. D. Roberts, on lantern slides in natural colours of the Grand Cañon of the Colorado, the Sierra Nevada, California and the Yellowstone Park.

NOTES.

THE *London Gazette* announces that Sir William Turner Thiselton-Dyer, K.C.M.G., C.I.E., F.R.S., Director of the Royal Botanic Gardens, Kew, has been appointed Botanical Adviser to the Secretary of State for the Colonies.

DURING the first half of this month the weather over this country was very abnormal for the season. The reports issued by the Meteorological Office show that in the early part of the month a decided depression approached from the north-west, the centre advancing over Scotland, travelling to the south-east, and causing thunderstorms and hail in many places. The subsequent distribution of pressure, which was relatively high off our south-west coasts and over north and south-west Europe, while depressions lay in various parts of the intervening regions, occasioned persistent inclement northerly and north-easterly winds. These continued with little variation until May 14, by which time a great change occurred in the type of pressure, under the influence of which westerly winds and some rise of temperature subsequently occurred, but heavy and sudden downpours of rain continued between the bright intervals. For any comparison of the persistent cold spell it is necessary to go back to the year 1879, when, during the first half of May, the mean of the daily shade maxima at Greenwich was approximately 54° and the minima 36°, against 53° and 37° in the corresponding period of this year. The maximum shade temperature on any day has not exceeded 57°·3, but in 1879 the maximum temperature exceeded 60° on three occasions and reached 66°·2 on May 5. On the night of the 13-14th, the exposed thermometer on the grass registered 22°·6 in the neighbourhood of London, and the maximum of the previous day was about 14° below the normal, while in May 1879 the lowest grass temperature was 24°·6. An examination of the Greenwich records since 1840 shows that there has been no year, except the present, in which the shade temperature has not reached 60° during the first half of May.

IN NATURE of February 20 (vol. lxv. p. 367), Mr. A. B. MacDowall pointed out that the Greenwich observations of the last thirteen years favour a connection between thunderstorms and the lunar phases, as has been found for other places. Investigation of the meteorological records of several observatories show that a larger percentage of thunderstorms occur about the time of new moon than about full moon, and in the two earlier phases than in the two later. M. V. Ventosa writes from the Madrid Observatory to say that he has obtained similar evidence of this relationship from an examination of observations made at that Observatory in the twenty years 1882–1901. Classified in four groups about four lunar phases, the results are as follows:—

	New Moon.	First Quarter.	Full Moon.	Last Quarter.
Thunderstorms ...	132	104	99	120
Percentage ...	29·0	22·8	21·8	26·4

Mr. MacDowall, to whom we have shown M. Ventosa's letter, remarks:—"The results are an interesting extension of the subject. While at none of the stations which have thus been compared are the differences between those weekly percentage numbers large, the general agreement, in showing, especially, more thunderstorms about new moon than about full moon seems remarkable, and may (I also hope) incite to further inquiries in the same direction, where the requisite data are available."

SEVERAL correspondents have sent us references to observations of peculiar lunar halos such as that described by Prof. Barnard in our issue of May 1 (p. 5). The singularity consisted in the moon being in the centre of one halo and on the circumference of another at the same time. Mr. H. W. Croome Smith directs our attention to a similar appearance observed on February 28, 1890, and described in the *Bristol Times and Mirror* of the following day. The moon was then nine days old, so that the conditions were very similar to those existing at the time of Prof. Barnard's observation.

THE last Report of Mr. W. Bell Dawson, C.E., on the survey of the tides and currents in Canadian waters contains an interesting account of the work that is being carried on in obtaining data as to the tides in the St. Lawrence and in the Bay of Fundy, and in the preparation of trustworthy tide-tables for Halifax, Quebec, St. John's and British Columbia. The part of the Report of most general interest is that relating to the tides in the Bay of Fundy. Further observations which have been obtained during the past year confirm the statement previously made by Mr. Dawson that the range of these tides has been greatly exaggerated. The range of spring tides in Noel Bay when they are at a maximum is 50½ feet and 43½ feet at neaps; at Horton Bluff, 48 feet and 40 feet; at Cumberland Basin, 45¼ feet and 38 feet. The difference between the level of the highest known tide, the "Saxby tide" of 1869, and the lowest point to which the water has been known to ebb out is 53 feet. The rise of this tide above mean sea-level was 29·24 feet, and the level of the lowest known low water below mean sea-level was 23·76 feet. The record tide of 1869 rose from 2 to 3 feet above the banks which protect the enclosed marshes and flooded the country.

IN our issue of February 13 (vol. lxv. p. 350), two new forms of electric resistance furnace suitable for laboratory work were noticed. The *Zeits. f. Elektrochemie* of April 3 contains details of a research carried out by Herr W. C. Heraeus with a modified form of this furnace relating to the melting point of manganese. The coil of platinum wire was replaced by a strip of very thin foil, wound spirally round the porcelain tube. A temperature of 1300° C. could be attained in three minutes with a tube 16 mm. in diameter having a spiral 15 cm. in length wrapped upon it, and by careful attention to the resistance, temperatures could be observed to within 5° C. of absolute accuracy. The tube employed in the observation of the melting point of manganese was provided with an alumina boat to carry the small piece of metal used for the determinations—with rubber connections by which hydrogen gas was passed through the tube during the observation—and with a small telescope by means of which the exact moment of melting could be noted. A Chatelier thermo-element was used for recording the temperatures. The mean of six determinations gave 1245° C. as the melting point of the metal. Attempts to use nitrogen and carbonic acid gas in place of hydrogen failed, since the former gas yielded a nitride with the manganese and the carbonic acid gas dissociated at 1000° C. The reducing action of the hydrogen